Development of Geo-simulator using 3D Solid Model and Computer Projector

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Outline of Presentation

• Introduction
• 3D Solid Model
• Projection of GIS Data
• Applications of Geo-simulator
• Conclusions
Introduction

• A real solid 3D model is much better than 3D bird’s eye view on a computer monitor
• But, color painting of 3D solid model was expensive and time consuming
• A LCD projector will solve the problem
3D Solid Model

- A numerical control (NC) machine cuts a white plastic board according to DEM.
- The size of a board is 100cmx120cm in area and 10cm in height.
- Cutting accuracy will be around 1mm.
NC Machine and 3D Solid Model
Geometric Problem of LCD Projector

- A LCD projector converts 2D GIS data to a central projection
- As 3D solid model is based on ortho-coordinate system, the projected image results in somewhat displacement depending on DEM
Displacement
Required Distance between LCD Projector and 3D Solid Model

• As a test result, displacement of less than 5mm is acceptable on a model

• If the datum is taken on the middle plane, the distance should be more than 5m

• The view angle should be less than 11.4 degree
Test Sample of 3D Solid Model

- Test Area: Daisetsu-zan Area, Hokkaido, Japan
- DEM used: 10m grid; max.H=2290m
- LCD used: EPSON
Experimental Geo-simulator
Projection of GIS Data onto 3D Model

• Level sliced color DEM
• Route location of a designed road
• Simulation of snow fall
Proposed Design of a Geo-simulator
Human Face Model with Geo-simulator
Conclusions

• Geo-simulator is a powerful tool for a real 3D visualization

• The biggest advantage of Geo-simulator is that arbitrary 2D GIS data or images can be projected onto a 3D model by a LCD projector